

AMENDMENT OF THE CLAIMS

Claim 1 (currently amended)

1. A microtube for surgery and dentistry, the microtube comprising:
 - (a) a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition;
 - (b) an interior axial opening extending from the anterior to the posterior end of the tubular member; and
 - (c) a side port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for ~~delivery~~ delivering to the site a therapeutic agent to be used for the surgical or dental procedure.

Claim 2 (currently amended)

2. The microtube of claim 1, ~~wherein the microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns~~ further comprising:
 - (d) means for connecting the posterior end of the tubular member to a source of the therapeutic agent.

Claim 3 (currently amended)

3. The microtube of claim 1 ~~2~~, ~~further comprising: a front port connected to the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to the site of the surgical or dental procedure, and for delivery to the site a therapeutic agent to be used for the surgical or dental procedure~~ wherein the means for connecting the posterior end of the tubular member to the source of the therapeutic agent include a flange.

Claim 4 (currently amended)

4. The microtube of claim 1, wherein the therapeutic agent is a pressurized fluid, for applying pressure at the site of the surgical or dental procedure.

Claim 5 (currently amended)

5. The microtube of claim 1, wherein the therapeutic agent is an evacuated fluid, for applying a vacuum at the site of the surgical or dental procedure.

Claim 6 (originally presented)

6. The microtube of claim 1, wherein the therapeutic agent is a pharmaceutical agent.

Claim 7 (currently amended)

7. A microtube for surgery and dentistry, the microtube comprising:
 - a. a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition;
 - b. a port disposed at the anterior end of the tubular member; and
 - c. an inner core of a material capable of transmitting a laser beam, the inner core extending from the posterior end ~~through~~ through the port at the anterior end of the tubular member.

Claim 8 (originally presented)

8. The microtube of claim 7, wherein the port is a side port.

Claim 9 (cancelled)

Claim 10 (currently amended)

10. A method for transmitting a therapeutic agent to a site of a surgical or dental procedure, the method comprising the steps of:

- a. providing a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition; an interior axial opening extending from the anterior to the posterior end of the tubular member; and
a side port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for ~~delivery~~ delivering to the site a therapeutic agent to be used for the surgical or dental procedure;
- b. connecting the ~~side~~ port of the tubular member to the site of the surgical or dental procedure;
- c. connecting the axial opening at the posterior end of the tubular member to ~~the~~ a source of the therapeutic agent; and
- d. delivering the therapeutic agent to the site of the surgical or dental procedure.

Claim 11 (currently amended)

- 11. The method of claim 10, wherein the microtube ~~has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns~~ includes means for connecting the axial opening at the posterior end of the tubular member to the source of the therapeutic agent.

Claim 12 (currently amended)

- 12. The method of claim 10, ~~further comprising the steps of e. providing a front port at the anterior end of the tubular member; and f. connecting the front port to the site of the surgical or dental procedure~~ wherein the means for connecting the axial opening at the posterior end of the tubular member to the source of the therapeutic agent include a flange.

Claim 13 (currently amended)

- 13. The method of claim 10, wherein the therapeutic agent is an evacuated fluid, for applying a vacuum at the site of the surgical or dental procedure.

Claim 14 (originally presented)

14. The method of claim 10, wherein the agent is a pharmaceutical agent.

Claim 15 (currently amended)

15. The method of claim 10, wherein the therapeutic agent is a pressurized fluid, for applying pressure at the site of the surgical or dental procedure.

Claim 16 (currently amended)

16. In a dental method for a root canal comprising drilling a tooth, mechanical canal debridement, and chemical canal debridement, the improvement comprising the steps of:
- (a) providing a microtube comprising a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition; a port disposed at the anterior end of the tubular member; and an inner core of a material capable of transmitting a laser beam, the inner core extending from the posterior end through the port at the anterior end of the tubular member;
 - (b) disposing the port of the tubular member at the site of the root canal;
 - (c) disposing the axial opening at the posterior end of the tubular member at a source of the laser beam; and
 - (d) delivering the laser beam through the port of the tubular member to the site of the root canal, thereby combining the mechanical canal debridement and the chemical canal debridement into a single procedure, enabling removal of pulpal tissue in three-dimensional volume elements which files and other instruments cannot reach, and sterilizing the canal and ablating the pulpal tissue.

Claim 17 (currently amended)

17. The dental method of claim 16, further comprising the steps of:
- e-(e) providing a microtube comprising a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition; an interior axial opening extending from the anterior to the posterior end of the tubular member; and a side port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for ~~delivery~~ delivering to the site a therapeutic agent to be used for the surgical or dental procedure; and
 - f-(f) delivering through the port of the tubular member to the site of the ~~surgical or dental procedure~~ root canal a sealant, thereby obturating the tooth at the site of the root canal.

Claim 18 (currently amended)

18. The method of claim ~~17~~ 16, wherein the port is a side port.

Claim 19 (currently amended)

19. The method of claim 17, wherein the ~~port is a front port~~ microtube includes means for connecting the posterior end of the tubular member to the source of the therapeutic agent.

Claim 20 (currently amended)

20. The method of claim ~~16~~ 19, wherein the ~~microtube has an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns~~ means for connecting the posterior end of the tubular member to the source of the therapeutic agent include a flange.

Claim 21 (cancelled)

SUMMARY OF THE OFFICE ACTION

Claims 1 – 21 are pending in the application.

Claims 1 – 21 are rejected.

THE CLAIMED INVENTION

In a first aspect, the present invention provides a microtube for surgery and dentistry.

A first embodiment of the microtube comprises a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns. The tubular member is fabricated by metallic electrodeposition. An interior axial opening extends from the anterior to the posterior end of the tubular member. A port is disposed at or near the anterior end of the tubular member. The port is constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for delivering to the site a therapeutic agent to be used for the surgical or dental procedure.

The microtube further comprises means for connecting the posterior end of the tubular member to a source of the therapeutic agent. The means for connecting the posterior end of the tubular member to the source of the therapeutic agent include a flange.

The therapeutic agent may be (a) a pressurized fluid, for applying pressure at the site of the surgical or dental procedure; (b) an evacuated fluid, for applying a vacuum at the site of the surgical or dental procedure; or (c) a pharmaceutical reagent.

A second embodiment of the microtube comprises a tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns. The tubular member is fabricated by metallic electrodeposition. A port is disposed at or near the anterior end of the tubular member. An inner core of a material capable of transmitting a laser beam extends from the posterior end through the port at the anterior end of the tubular member.

In a second aspect, the invention provides a method for transmitting a therapeutic agent to a site of a surgical or dental procedure. The method comprises (a) providing a

tubular member having anterior and posterior ends, an outside diameter of from about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, the tubular member being fabricated by metallic electrodeposition; an interior axial opening extending from the anterior to the posterior end of the tubular member; and a port disposed at the anterior end of the tubular member, and constructed and arranged for connecting the axial opening to a site of a surgical or dental procedure, and for delivering to the site a therapeutic agent to be used for the surgical or dental procedure; (b) connecting the port of the tubular member to the site of the surgical or dental procedure; (c) connecting the axial opening at the posterior end of the tubular member to a source of the therapeutic agent; and (d) delivering the therapeutic agent to the site of the surgical or dental procedure.

The therapeutic agent may be (a) an evacuated fluid, for applying a vacuum at the site of the surgical or dental procedure; (b) a pharmaceutical reagent; or (c) a pressurized fluid, for applying pressure at the site of the surgical or dental procedure.

In a third aspect, the invention provides an improved dental method for a root canal comprising drilling a tooth, mechanical canal debridement, and chemical canal debridement. The improvement over the prior-art method for a root canal comprises using either embodiment or both embodiments of the microtube to transmit a laser beam, a therapeutic agent, or both a laser beam and a therapeutic agent and to the site of the root canal.

SCOPE OF THE CITED PRIOR ART

United States Patent (U.S.P.) 6,135,769 to Kwan discloses an apparatus for intraosseous injection for dental application. The application comprises a hollow drill (1) having a perforation or perforations (2) along its length, and a beveled cutting end (3), fitted into a hub (4) of partly circular and partly hexagonal external cross-section, and provided with a circumferential lip (5) and a funnel-shaped orifice (6) giving access to the open end of the hollow drill at its end remote from said cutting end, and an adapter (7) removably mated with said hub by means of a matching orifice of substantially hexagonal cross-section and having at its end remote from said orifice a shank (8) shaped to fit into the chuck of a standard contra-angle dental handpiece, and a protective cap (9) fitted over the hollow drill. After piercing the cortical bone with the hollow drill, the adapter and handpiece are removed, leaving an unobstructed passage through the hollow drill to the cancellous bone for the injection of a conventional dental needle for the injection of anesthetic or other solution to the cancellous bone via the perforations (2), after which the hollow drill is withdrawn and disposed of.

THE EXAMINER'S RATIONALE

In rejecting claims 4, 5, 13 and 15 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, the Examiner states that the terms "pressure" and "vacuum" in claims 4 and 5 are used by the claim to mean "therapeutic," while the accepted meaning is "a fluid"; and that it is unclear how pressure and vacuum are regarded as a therapeutic agent.

In rejecting claims 1, 3 – 10, and 12 – 19 under 35 U.S.C. 102(b) over U.S.P. 6,135,769 to Kwan, the Examiner states that Kwan discloses a microtube comprising a tubular member (1), an interior axial opening (FIG. 1), a side port (2) [and a front port] (3). The Examiner further states that the device of Kwan is fully capable of performing the functions as set forth by applicant; as to claim 3, FIG. 1; as to claims 4 – 6, when the syringe applies a therapeutic agent (col. 3), it also applies the agent with pressure, and a syringe action can be reversed to cause vacuum action; as to claims 7 – 10 and 12 – 15, see above rejections; as to claim 16, see MPEP 2112.02 and above rejection; as to claims 17 – 19, see above rejection.

In rejecting claims 2, 11, 20 and 21 under et U.S.C. 103(a) over the patent to Kwan, the Examiner states that Kwan discloses a microtube substantially as claimed except for an outside diameter of about ten to about one hundred microns, and an inside diameter of from about five to about fifty microns, that it would have been an obvious matter of design choice to change the size of the microtube, since such a modification would have involved a mere change in size of a component, and that a change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ (CCPA 1955).